CONSERVATION PRACTICES FOR THE RANGE LANDS OF THE SOUTHERN GREAT PLAINS

SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE

THIS IS one of a series of three publications that deal separately with the conditions and problems that must be met in effecting soil and water conservation on three distinctive kinds of land in those parts of Kansas, Colorado, Oklahoma, Texas, and New Mexico included in the southern Great Plains. It furnishes practical guidance in soil and water conserving methods for the range lands. Similar publications are being printed for farmers of the sandy lands and the hard lands of the southern Great Plains.

The text sets forth briefly (1) the necessity for adapting range-conservation practices to the land and its plant cover; (2) a designation of the broad classes of land of the southern Great Plains that may respond to similar conservation treatments and a description of the range lands dealt with in this publication; and (3) a discussion of conservation practices recommended by the Soil Conservation Service for use on various types of range lands of this region.

A complete discussion of the details of installation and execution of various range-conservation practices and measures is not attempted in this publication. On the other hand, it does set forth recommendations regarding the appropriateness of various practices for the different types of range found on the southern Great Plains, and conditions under which the practices are most applicable. It has been prepared primarily for ranchers and stockmen who desire information about the selection and advantages of the practices for conservation of their particular ranges and type of ranching.

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Conservation Practices for the Range Lands of the Southern Great Plains

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INTRODUCTION

The grazing lands and the grass they produce are important to the southern Great Plains. Approximately 33,000,000 acres of the better land in the southern Plains are now cultivated, but there are still some 67,000,000 acres in those portions of Kansas, Colorado, New Mexico, Texas, and Oklahoma included in this region (see map, inside back cover) that never have been plowed up. On most land not in cultivation livestock grazing is the primary use and probably will remain so in any permanent and stable agricultural economy of the Plains.

Some 6,000,000 acres of virgin grassland in the southern Great Plains are suitable for crop production if the best soil and water conservation practices are followed. A part of this land unquestionably will be placed in cultivation at future dates. On the other hand (according to recent surveys by the Soil Conservation Service), there are approximately 6,000,000 acres of land now cultivated which are not suitable for cropping. Eventually most of this land that is submarginal for farming will be retired from cultivation and developed for use as grazing land.

Droughts, crop failures, and the resulting duststorms of the past decade attracted Nation-wide attention to the southern Plains as the Dust Bowl. The control of wind erosion on cultivated lands was recognized as a national problem soon after the severe duststorms of 1934 and 1935. Soil blowing and general land destruction have not been so noticeable on the range lands; nevertheless, there has been a

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considerable decline in grass production on a high percentage of the grazing lands throughout the region, and, in some instances, there has been severe wind erosion; in other cases, sheet and gully erosion have severely damaged large acreages.

Range conservation is not a new problem to ranchers of the Plains. Ever since the advent of barbed wire and restricted land holdings in the short-grass country, ranchers have been confronted with the problem of getting the greatest immediate returns from their range

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FIGURE 1.—Much of the range land of the southern Great Plains has been depleted during recent years, and some of it has been seriously damaged. This range has been made worthless for immediate use by soil blowing from adjacent lands, drought, overgrazing, and other causes.

while leaving it in good condition for succeeding years. The extended drought of the 1930's, however, made the problem more acute. Great advances have been made and much knowledge accumulated as to range-conservation practices in recent years; yet much remains to be done because most of the range lands of the southern Plains are depleted to some extent and in some cases they are seriously damaged (fig. 1).

Suitable conservation practices for range lands vary over the southern Great Plains owing to differences in rainfall, wind velocities, length of growing season, altitude, and other factors. The physical factors that call for the greatest variations in conservation practices, however, are the wide differences in the type and condition of the land and in the kind and condition of the plant cover.

Broad stretches of almost level land are common on the Plains, but undulating, rolling, and steep broken lands also may be found in most sections. Silt and clay loams, loams, sandy loams, loose sands, and tight clays may be found interspersed throughout the region. Deep soils and shallow soils often lie side by side. A dense mat of nutritious grass blankets some range lands, while adjacent pastures with the same type of land have scant plant cover or are populated largely by weeds. Some pastures have been damaged seriously by wind and gully erosion, whereas neighboring land has as yet suffered but little in this respect. Some of these differences in the range are hardly discernible to the inexperienced, but, nevertheless, may be highly important to the practical rancher and call for marked variations in range-management practices. The ranch as a whole and each individual pasture must be treated in accordance with existing conditions and the capabilities of the land.

Three Broad Classes of Land

The lands of the southern Great Plains have been divided into three broad classes for the purpose of discussing suitable conservation treatments for dry-land farming and ranching. These broad classes are (1) the hard lands suitable for cultivation (see Unnumbered Publication, Conservation Farming for the Hard Lands of the Southern Great Plains); (2) the sandy and mixed lands suitable for cultivation (see Unnumbered Publication Conservation Farming for the Sandy Lands of the Southern Great Plains); and (3) the lands adapted only for range (medium-depth hard lands; shallow soils; loose, sandy soils; very heavy clays; and the rough, broken, and stony lands).

Each of these three broad classes may be divided into several groups according to variations in physical land conditions and climate where definite conservation recommendations are made; and a detailed survey or study of each tract may be needed where detailed plans are to be developed. Since, however, the conservation treatments that should be applied to most kinds of land within each of the three broad classes mentioned above will be similar in many respects, it seems feasible to discuss methods applicable to the range lands as a whole, with more specific recommendations for various problem-area groups of land within the class.[1]

THE RANGE LANDS

The range lands referred to in this publication include all the land of the region that under normal conditions is more suitable for use as grazing land than for other agricultural purposes. Since these lands have a wide range in physical characteristics, in order that more or

[1] U. S. Soil Conservation Service. Problem-area groups of land in the southern great plains. 40 pp. February 1939.

less specific recommendations can be made regarding applicable conservation practices, they are divided into five problem-area groups;[2] (1) The moderately heavy lands, with medium-depth soil (referred to hereafter as medium-depth hard lands or problem-area group No. 4); (2) the shallow grazing lands, with sandy loam to clay loam soils (hereafter referred to as shallow soils or problem-area group No. 6); (3) the loose sands and sand hill areas (hereafter referred to as loose, sandy soils or problem-area group No. 7); (4) the very heavy clay soils (hereafter referred to as heavy clays or problem-area group No. 8); and (5) the stony soils, rock outcrops, and rough broken land (hereafter referred to as rough, broken, or stony land, or problem-area group No. 9).

Many variations in soil type, physiography, and state of plant cover are found on the lands within each problem-area group, but, in general, needed conservation treatments are similar for each group.

A map of the region (inside back cover) depicts the general location and extent of the larger areas of range lands. It delineates the five different problem-area groups of land. Portions of the map without crosshatching are areas with other kinds of land.

The areas of land types depicted on the map are as accurate as existing information and the scale of mapping permit. Within the boundaries of most delineated areas are tracts of land too small to map, which are of a different type. A further refinement of the map, however, must depend on detailed surveys. It is intended that the recommendations of this publication be applied only to the lands described as range lands and not strictly to the areas shown as such on the map.

Frequently small pastures and occasionally large ranges are found on lands that may be suitable for cultivation (deep hard lands, deep, moderately sandy lands, and deep sandy loams with a moderately heavy to heavy subsoil). Conservation practices for such lands are discussed in this publication only in a general way, but the same practices recommended for the hard lands and sandy lands discussed herein are generally applicable. These croplands are more productive and when used for range they generally respond more readily to range conservation treatments than other lands. (See Unnumbered Publications, Conservation Farming for the Hard Lands of the Southern Great Plains, and Conservation Farming for the Sandy Lands of the Southern Great Plains.)

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[2] Problem-area groups Nos. 4, 6, 7, 8, and 9 referred to in this publication, are number designations taken from groupings of the land of the southern Great Plains made by the regional office of the Soil Conservation Service, Amarillo, Tex., published in Problem-Area Groups of Land in the Southern Great Plains. The other problem-area groups of this series are: No. 1, alluvial soils; No. 2, deep moderately heavy cropland; No. 3, deep moderately sandy diversified cropland; No. 5, deep sandy row-crop land; and No. 10, mountainous areas. Range-conservation practices for these groups are discussed in this publication only in general terms.

The Medium-Depth Hard Lands

The term "medium-depth hard lands," as used in this publication, refers to all of the nonirrigated land of the region having a loam to clay loam surface soil, and a medium-depth to deep topsoil, where the combined thickness of the topsoil and the permeable subsoil ranges generally from 16 to 30 inches. These lands are found in relatively large blocks in the north central part of the region, and many small areas are scattered throughout the Plains. There are about 11 million acres of the medium-depth hard lands in the southern Great Plains, but approximately 2½ million acres in the eastern part of the region are considered suitable for crop production. This leaves about 8½ million acres that should be used primarily for grazing.

In general, these soils have a high moisture-holding capacity. On the more gentle slopes, the rate of run-off is slow, if the ground is well covered with grass. Since the soils usually absorb moisture slowly, a large amount of run-off may occur during heavy rains, even on almost level lands, if the plant cover is sparse; and on the steeper slopes run-off may be rapid enough to cause both sheet and gully erosion. Lands of this type are considered among the best lands in the region that are commonly used for grazing.

Medium-depth hard lands generally are found on gently sloping to undulating areas. The slopes seldom are greater than 5 percent. Large areas in extreme western Kansas and eastern Colorado and smaller areas in other sections have been damaged seriously by wind erosion where cultivation has been attempted. Many of the ranges that were overgrazed and abused also have suffered severe wind erosion, and often pasture lands have been damaged by soil blowing from adjacent cultivated fields. These lands are only moderately susceptible to water erosion.

Shallow Soils

The shallow soils referred to in this publication include all the nonirrigated land of the region that has a combined depth of topsoil and subsoil generally less than 16 inches, except the rough, broken, or stony lands, the very heavy clays, and mountainous areas. Generally they are not suited for cultivation because of their shallow depth, low productivity, and susceptibility to erosion. Many variations in soil texture, structure and depth may be found within this group of lands, but as a whole they have similar capabilities as grazing land.

Relatively large blocks of the shallow soils extend across the western part of the region, and large or small tracts are found in most localities. Most of the lands of this type have a rolling relief, but there are some shallow soils on relatively gentle slopes in the western part of the region. In the eastern areas, these lands usually are found on moderate to

steep slopes and in the vicinity of streams. There are about 23,000,000 acres classed as shallow soils in this region.

The rate of water absorption varies according to the texture of the soil. The rate and amount of run-off varies, but is usually high because of the relatively steep slopes and the frequent lack of dense plant cover. The water-holding capacity is normally low because of the shallow depth.

Both wind and water erosion are serious when the land does not have an adequate cover of vegetation. The more steeply sloping grasslands have suffered both sheet and gully erosion where overgrazed. Wind erosion has been very severe in some areas where the grass stand was killed out by overgrazing or drought, and in areas where erosion from adjacent cultivated lands has spread onto pasture lands of this class.

Loose, Sandy Soils

The loose, sandy soils, referred to in this publication, include all the loose deep sands and sand-hill areas of the region. These are primarily either grazing or waste-land areas. They should not be confused with sandy croplands, which usually have a sandy loam or loamy sand surface texture and moderately heavy subsoil.

Lands of this type ordinarily were developed as wind-blown soils, and, owing to their type of development, they usually have an undulating to dunelike relief. In a few locations, however, they are relatively smooth. Since they absorb water readily, they seldom have developed drainage systems. They are found in large and small tracts interspersed with lands of other types in all parts of the region. They often are found in the vicinity of large streams. They cover approximately 8½ million acres. There also are about 6 million acres of loamy sands and sandy loams considered suitable for cropping if properly managed, that are used for pasture or range. (See Unnumbered Publication, Conservation Farming for the Sandy Lands of the Southern Great Plains.)

Water erosion is not a problem on these very sandy soils because of the small amount of run-off. Wind erosion is a very serious problem where they are denuded of plant cover. Serious wind erosion often occurs on lands that have been grazed too closely, where grass has been trampled out around watering places, salt licks, or other concentration areas of livestock, and where the lands have been placed in cultivation.

The Heavy Clays

The heavy clays, referred to in this publication, include only the very heavy textured soils of the region. The soils are shallow to medium in depth and usually are developed from shale. The very heavy texture gives them extremely slow water-absorbing ability,

and run-off is rapid where slopes are moderate to steep or if the vegetative cover is sparse. Their very tight texture makes both moisture conservation and erosion control a difficult problem.

The heavy clays sometimes are found with a smooth to slightly rolling relief, but relatively steep slopes predominate on most lands of this type. The drainage system usually is well-developed, and, because of the rapid rate of run-off, these lands are often a source of flood water. They cover slightly less than 2,000,000 acres of the region. The large areas of these lands are principally in east central and southern Colorado, but small tracts are found in many localities and often lie adjacent to hard lands of less impervious nature.

Both wind and water erosion progress rapidly when the soil is bare. Severe gullying and sheet erosion have occurred on many areas, especially where the slopes are steep and the grass cover has been depleted. Wind erosion has been severe on tracts that have been placed in cultivation and on pasture lands where the grass cover has been destroyed.

Rough, Broken, and Stony Lands

The rough, broken, and stony lands referred to in this publication include all the stony soils, rock outcrops, and rough, broken lands of the region except those in mountainous areas. Foothills having a scattered growth of shrubs utilized primarily for grazing are included.

These slightly developed soils include various textures from sand to heavy clay. Most soils are very shallow, and frequently the parent rock or stony material is exposed at the surface. Water-absorbing ability of these soils varies, but the rate of run-off is rapid on much of this land because of steep slopes and poor plant cover. These areas often are a source for flood water.

Rough and broken lands are found in small and large tracts along most streams of the region. Rough and stony areas are found in relatively large tracts along the western side of the region near the foothills of the mountains. Slightly more than 9,000,000 acres of lands of this class are found in the region.

A relatively large amount of normal erosion occurs constantly on the more unstable areas. Accelerated water erosion has been aggravated on many areas by overgrazing. Wind erosion is a minor problem. Practically the only lands of this type in cultivation are small tracts of stony lands that occur in larger fields of a different type of land.

CONSERVATION PRACTICES

Many kinds of conservation practices are adapted for use on the ranges of the southern Great Plains. By far the most important is the adjustment of grazing to bring about a proper balance between the amount of vegetation consumed by livestock, and that left to

protect the soil. Water-conservation practices are particularly useful in alleviating the effects of drought and in promoting recovery of the range following extended periods of unfavorable conditions. Revegetation of depleted grasslands on formerly cultivated lands is also an important conservation practice. Development of adequate range improvements, such as fencing, water developments, and other facilities for handling livestock, are particularly important in securing and maintaining proper use and effective utilization of range and forage resources. The use of supplementary pastures and production of home-grown feeds, where suitable land is available, may indirectly help to conserve the range.

A range-conservation program should utilize all types of conservation measures adapted to the range involved. The use of only a part of the desirable conservation measures will usually fall far short of the goal, and in some instances may be worthless or even harmful. It is also highly essential that the various conservation practices and treatments applied to any given tract of *range land* be so correlated that each practice used will supplement the other conservation methods in use.

Grazing Practices

Proper grazing is the first and most important requirement for a range-conservation program. Grazing plants which are depleted in vitality and of a sparse stand cannot be expected to produce the maximum amount of forage. Satisfactory results cannot be expected from any supplemental practices such as water conservation or revegetation unless the land is grazed properly. In planning a grazing program, it is necessary to consider not only the needs of the livestock which will be using the area, but also the needs of the grass and other forage plants, and the physical conditions of the land.

Grasses of the range should be considered as a crop which must not only produce the forage used during the current season, but also be in condition to produce a good crop the following season. In the case of annual plants, this means that seed must be produced. The production of a seed crop by perennial short grasses may not be of great importance in maintaining the stand, but it is important that the plants not be grazed so closely as to impair their vigor. Perennial plants should store sufficient nutrients in the roots and buds to enable them to begin vigorous growth the following season. Grass plants do not manufacture food in the roots. The roots take moisture and plant nutrients from the soil and transport them to the leaves where they are manufactured into plant materials. Proper development of the root system is dependent on adequate growth of that portion of the grass plant above the ground. Overgrazing of the plants during the growing season usually results in a decrease in the size and vigor

of the root systems, which, in turn, makes the plant less able to use available moisture and plant food in the soil. If livestock are held on an area until they begin to lose weight, the grass may be damaged to such an extent that it will not be able to produce an equal crop the following season. Weakened vitality also may result in excessive loss by death of grass plants during periods of moisture shortage.

Plant growth also is important from the standpoint of maintaining soil fertility and preventing erosion. Both run-off and soil loss are much less, and may become negligible, under a heavy growth of grass. Vegetation on the ground affords shade that reduces surface evaporation and offers protection to young plants starting growth. A complete removal of plant cover by heavy grazing even during the winter is an undesirable practice.

TIME FOR GRAZING

Most of the grazing lands of the southern Great Plains that are in good condition may be grazed rather heavily at certain seasons without injuring the vitality or stand of grass. Since the most critical time in the life of any plant—either perennial or annual—is at the beginning of growth, grazing should be as light as possible during the early spring on most ranges. The time for proper grazing depends not only on the kind of range but on its condition. Badly depleted range is usually improved faster by restricted use and protection from grazing during the growing season than by any other treatment. Deferred spring grazing is highly important on range in poor condition, because the forage plants must not only maintain themselves, but also should develop additional vitality and reserve so that improvement will result.

Since blue grama grass grows more following summer rains than after early spring rains, it often is advisable to restrict grazing during the summer rather than in the early spring on depleted ranges where this grass predominates. Also, such grasses as three-awn, saltgrass, tobosa, and ring muhly should be grazed while green and growing because they become harsh, woody, and unpalatable after they reach maturity. When these species have invaded grama grass range, early spring grazing and restricted summer use often prove advantageous because this practice will help to control the less desirable grasses and give the grama a chance to increase in density.

Good results may be expected from a system of rotation and deferred grazing that gives every part of the range an opportunity to grow to maturity at least once every 3 or 4 years (fig. 2). On many types of ranges more total forage will be produced under a proper system of rotation grazing than if the range is grazed continuously.

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It is possible on some ranches to secure a very satisfactory grazing rotation by simply closing the water holes on the range to be protected.

The short grasses of the southern Plains, such as buffalo and blue grama, usually suffer less from continuous grazing than most other species, but they probably will yield more total forage over a period of years when grazed in rotation. Restricted grazing is almost imperative on severely depleted ranges, or if erosion and soil losses have

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FIGURE 2.—Fencing to divide large pastures and permit rotation and deferred grazing on depleted areas is a desirable practice. The depleted pasture to the left of the fence is being rested for an entire growing season and is making a rapid recovery.

been serious. If the more desirable forage plants are expected to increase in competition with undesirable species, rest periods are essential.

Rotation to permit alternate use of pastures during the growing season, may not be practicable on ranches which have some ranges that are more suitable for use during one season than another. If topography is such that certain areas afford protection during winter months, or types of forage are produced that can be utilized to advantage only during certain seasons, it may be necessary to use the same ranges more or less continuously during the growing season year after year. It is imperative that grazing be light enough to permit accumulation of reserves of grass during the grazing season on the pastures subject to continuous use during the growing season.

THE GRAZING LOAD

A grazing load that is suitable for a pasture during normal years usually will be entirely too heavy for the same pasture during drought years. Damage may be done by overgrazing a range during drought periods to the extent that productiveness will be decreased when conditions return to normal. A heavier than normal rate of grazing may be used without detriment to a good range when conditions are above average. Often it is not possible for the ranch operator conveniently to adjust his herd to all variations in growing conditions, but it is important that the grazing load be reduced during seasons when production is below normal. The number of animals must be reduced during severe droughts to the extent that they will not graze the range beyond a point where rapid recovery can be expected when conditions again become normal. Moreover, adjustment should not be postponed until loss of livestock and extreme depletion occur.

Results of research by the Forest Service indicate that the basis of stocking should be somewhat below average forage production so as to insure adequate feed for livestock during most years.

A limited amount of experimental study supported by careful observations of ranchmen and range workers indicates that over a period of years a greater profit may be expected from grazing a smaller number of well-fed animals, rather than a greater number that do not receive enough forage for normal gains. One authority defines proper stocking as the least number of animals which will produce the greatest total gain from a given range.

GRAZING DISTRIBUTION

One of the most important features of range conservation is to maintain a proper distribution of grazing animals so that localized areas are not overgrazed, while other sections of the same pasture are undergrazed. Overgrazing of local areas often may be found even on ranges that are not overstocked if there is inadequate distribution of water developments, or if fences or other range improvements are improperly located. Excessive trampling of livestock around water holes, salt licks, windbreaks, or other concentration areas may result in wind or water erosion which eventually spreads to other parts of the range.

Adequate distribution of stock watering places is an effective means of spreading the grazing load equally over all parts of a pasture. It may be desirable to have watering places not more than a mile apart, but spacing at such close intervals often is not practical because of the cost or lack of possible sites for development. Watering places should be spaced so that livestock will travel to the area which is farthest from water without being forced to do so from feed shortage. The distance cattle will travel for water varies greatly according to topog-

raphy, temperature, and other factors. In some parts of the southern Plains a tendency to concentrate and overuse the areas near water may be noted when cattle must travel more than a mile for suitable water supplies. In other sections cattle may travel 2 miles or even more under favorable weather conditions and on relatively smooth terrain without a noticeable tendency to overgraze severely areas near the water.

Sufficient fences and their proper location will aid greatly in distributing livestock over the range. Formation of pockets should be avoided in building fences and they should be so placed that animals will not have to cross deep ravines, high ridges, or other natural obstructions in traveling to water and feed.

Placing of salt on the parts of the range which otherwise might not be grazed may encourage livestock to frequent such areas and thus effect the proper distribution. Rotation grazing may relieve trampling and overgrazing on many areas that are subject to concentration. In other cases it may be practical to fence off localized areas that are being grazed or trampled too heavily. It may be necessary to shift cattle occasionally by driving them if proper distribution is not secured otherwise.

Where sheep are under herd, the problem of distribution can be handled by the herder, who will be able to see that all parts of the range are uniformly grazed. In order to avoid excessive trampling, sheep should be held in open and well spread-out bands and not be driven over the same trails day after day to water or bed grounds. Frequent moving of bed grounds also is desirable. Some sheepmen in the southern Plains are using sheep fences very satisfactorily and thereby eliminating herding and the concentration of animals that occurs in herding, even under the most careful management.

ADJUSTING GRAZING PRACTICES TO THE LAND

On the medium-depth hard lands, the tight shallow soils and heavy clays (problem-area groups Nos. 4, 6, and 8),[3] the principal forage plants are buffalo grass, blue grama, and side-oats grama. Western wheatgrass, saltgrass, sacaton, tobosa, and galleta occur in valleys and swales, particularly those that are flooded periodically. Sand dropseed and three-awn are common in some sections, but are of less value for grazing use. Except for small areas the key plants are grama grass and buffalo grass, which supply the major part of the forage on this type of range (fig. 3).

Buffalo and grama grasses generally can be grazed at any season of the year and often can be used moderately for yearlong grazing without damage to the range. This type of range produces excellent forage.

[3] See footnote 1, p. 3.

Tobosa and sacaton occur in small localized areas and are most valuable for summer forage and generally should be utilized at this time. In the areas of very thin shallow soil, moisture and fertility are generally low and grass is less able to withstand drought and overuse. Such areas are most frequently found on relatively steep slopes where the maximum cover is required to prevent erosion. Hence, use should be of such character that a considerable plant growth is left on land

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FIGURE 3.—A dense sod of ungrazed buffalo grass. This grass and the grama grasses are the principal grazing plants on the hard lands of the southern Plains. A dense sod, such as shown above, is very effective in preventing run-off and erosion.

with shallow soils or steep slopes in order to protect it from erosion and run-off and maintain vigorous grass plants.

On short-grass ranges grazing should be restricted so that a ground cover or mat of grass is maintained even during the winter months. A considerable volume and height of grass should be present at the end of the growing season to insure sufficient plant food development to maintain plant vitality. This type of range will withstand extremely close grazing without loss of sod cover, especially where buffalo grass predominates, because it reproduces from stolons and is very aggressive. Grazing too closely, however, usually will result in the production of less forage even though the sod cover is maintained.

Overuse of hard land ranges often results in considerable sheet erosion which may not be noticeable to the untrained eye, and the range

actually may be damaged considerably before erosion becomes apparent to the casual observer. Gullies may form in some cases, especially on the shallow soils and heavy clays. Where there is a heavy concentration of water, gullying may start without severe overgrazing of the immediate area if the grass has been depleted and excessive runoff occurs from the watershed above. Wind erosion also may become severe if the grass stand is killed out.

On sandy land ranges of the region the principal grasses usually are grama grass, sand dropseed, sand bluestem, sand reedgrass, and others which are especially adapted to growing in the sand hills. The grama grasses are found most commonly on the sandy loam soils. Much of the sandy range land has a mixed cover of the grasses named and such shrubs as sand sage, scrub oak or shinnery, and yucca. On many depleted areas the grass has been weakened or destroyed by overgrazing and other abuses, hence, shrubs are the principal and often the only vegetation.

Special precaution should be taken in the management of loose, sandy soils (problem-area group No. 7)[4] because of their extreme vulnerability to wind erosion. A good growth of grass stubble should be kept on the ground to prevent soil blowing. Grama grass cannot be grazed as closely on sandy lands as on the hard lands if the sod cover and soil stability are to be maintained. The bunchgrasses, found in many sandy areas, should be grazed carefully because they are much more dependent on production of seed for maintaining the stand than are the short grasses, and more topgrowth is necessary for proper development and maintenance of plant vigor. Deferred grazing during the early part of the growing season is especially important on sandy land ranges.

In some of the sandy areas, the shrub cover is utilized for grazing to a considerable extent. Sagebrush is considered a fairly satisfactory winter forage but is of little value at other seasons; hence, ranges with a considerable growth of sagebrush usually are reserved for winter use. Where this practice is followed, the grasses ordinarily have an opportunity to produce maximum growth during the summer, but being more palatable than the shrubs, they may be overgrazed and trampled out even during the winter if the range is overstocked.

Scrub oak ordinarily should be utilized during the spring and in the early summer when the tender shoots of new growth are relatively palatable and other forage is available to supplement the oak. Oak leaves may produce injurious effects at any time, but the critical period of use is in the early spring when there is a scarcity of other forage. The period when oak leaves are poisonous usually lasts about 2 weeks; hence at this time these ranges should receive a brief spring rest. By midsummer, "shinnery" becomes of little value and live-

[4] See footnote 1, p. 3.

stock should be moved off this type of range. Heavy spring grazing of scrub oak pastures may cause damage to the grass unless very careful management is exercised.

Because of the wind erosion hazard, recovery may be slow from overgrazing on loose, sandy soils; hence, the importance of avoiding damage in the beginning. Many range areas of sand land have been very much depleted from overgrazing because they were used too heavily in an attempt to obtain a better utilization of the shrub cover.

Rough, broken, and stony lands (problem-area group No. 9)[5] usually have a cover of grasses and shrubs of the same type as the hard land areas. Buffalo grass, blue grama, side-oats grama, three-awn, and similar species are most common. Black grama and hairy grama frequently are found on this type of range also.

The plant cover usually is sparse and these areas are generally less productive than other ranges. Because of the steep slopes and poor soils, these lands usually are subject to severe erosion and should be grazed lightly. On many steep slopes, all the cover that is produced should be left on the ground in order to prevent excessive run-off and subsequent erosion. Often it is advisable to exclude grazing on gullied tracts by fencing.

Under conservative grazing practices, livestock prefer to graze the more level lands; hence, light grazing of rough, broken lands usually will occur naturally. These lands sometimes are grazed heavily where the range is overstocked, because livestock then are forced to eat the forage in rough areas to supply their needs. The forage produced on rough, broken areas may be of little importance in itself, but severe erosion and run-off which may originate here can cause considerable damage to more productive lands downstream.

NOXIOUS PLANTS

Losses frequently occur from grazing livestock on areas infested with poisonous or noxious weeds such as loco, goldenrod, and others. Scrub oak areas may produce some loss of animals by death due to oak poisoning in the spring, as already explained. Often noxious plants such as cactus and mesquite which invade depleted ranges may not be poisonous, but are detrimental to the range because they have little feed value. Once established, these plants may be difficult to eradicate by any means.

Noxious plants usually occur at widely distributed points over the range and are likely to increase during periods of overgrazing, drought, wind damage, or when for any reason the range is in poor condition. Proper regulation of grazing may do much to alleviate the damage done by them and prevent their further spreading. Sometimes un-

[5] See footnote 1, p. 3.

desirable plants increase on ranges that are not overgrazed, but they seldom invade a range in good condition and usually decline as the condition and vigor of grasses increase. Water conservation practices may be beneficial in control of some species of pest plants such as cactus. Mowing, grubbing, treatment with chemicals, and other means may be employed with success in eradication of noxious plants; however, these methods are expensive and often are not economically feasible.

Ordinarily, grazing animals will not eat most poisonous species if there is sufficient forage of a more desirable quality on the range. Livestock usually start eating loco only when pressed by hunger, but once the habit is acquired, they may feed on it almost exclusively. On oak-brush ranges, which have desirable grasses, death from poisoning is rare because when animals are able to obtain a reasonable amount of other forage they are much less susceptible to the disease caused by eating oak twigs.

Noxious plants not only are unsatisfactory as forage, but are usually much less effective than grass in preventing loss of water as run-off, and erosion by both wind and water. While some shrub species, such as "shinnery" and sage, are utilized for forage and are not considered noxious where they occur naturally; they are much less effective than grass in holding soil and water.

Water Conservation

In a country where rainfall is sparse and infrequent, water is always important. All the rain that falls on range lands of the southern Great Plains is needed for the production of grass and should be held on the land and at the point where it falls, if possible. Run-off water not only is lost from the land but may be detrimental because of the resulting erosion.

A cover of grass is the best means of preventing water loss through run-off and also may prevent drifting snow from blowing off the land (fig. 4). Mechanical structures such as contour furrows and ridges, and water spreaders are beneficial as supplements to a growth of vegetation in controlling and preventing run-off. The use of water-conserving structures on the range is relatively new, however, and there is much to be learned regarding their values. Experimental studies regarding the types of structures most suitable and their effectiveness under different conditions are very limited.

Water-conservation structures are used on range land for flood control, prevention of erosion, and to maintain and increase grass production. The latter purpose is the one about which ranch operators are usually most concerned. Before proceeding with construction, however, consideration should be given to the possible benefits of such treatments in maintaining permanent stability and productiv-

ity of the range. Preventing even small losses through erosion may be relatively important over a period of years. Regardless of the purpose, before construction on a large scale is started two important questions should be answered: (1) Whether the proposed structures will accomplish the desired results or whether the forage can be increased and run-off halted by more conservative management, and (2) whether the cost will be excessive for the benefits to be derived.

COLO-4117

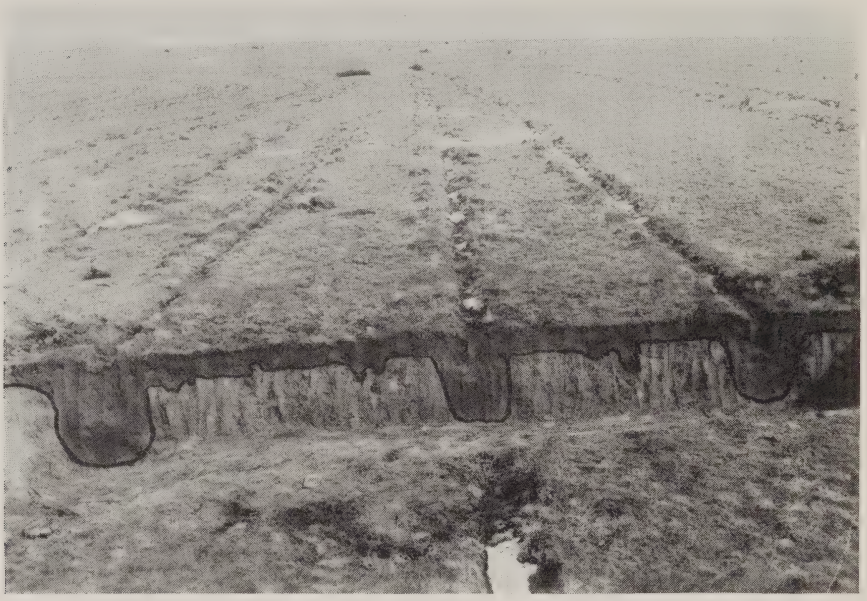
FIGURE 4.—A dense grass growth on the range not only checks run-off but also helps to hold drifting snow on the ground. Practically all of the snow has blown off the closely grazed pasture at the left.

It is difficult to determine the value of structural work for erosion and flood control because the amount of future damage to be expected and the effective life of the structures are usually uncertain. The effect of structures on forage production is less difficult to determine, since increased grass growth is more easily measured. Beneficial results are readily apparent to the eye in many cases and often are very convincing.

Under the best conditions, it is probable that the plant cover on most ranges would be adequate to reduce the run-off to a minimum. Under conditions of practical operations, however, there are times when mechanical structures will serve a very useful purpose if conditions are suitable for their use. Structural treatment also may hasten the recovery of depleted ranges.

CONTOUR FURROWS AND RIDGES

Contour furrows and ridges have been generally effective on range lands of gentle to moderate slope where soil productivity is sufficient to support the additional grass growth that the increased moisture supply encourages (fig. 5); and where soil blowing from adjacent lands is not severe. Contour furrows and ridges usually will not be satisfactory on loose, sandy soils, on rough, broken lands or on steep



TEX-7854

FIGURE 5.—Properly constructed contour furrows hold water on the range. Moisture penetration is thereby increased and made available for grass production.

slopes, and they are impractical for areas where large quantities of silt or sand accumulations may collect on them. Satisfactory response from contour furrowing usually cannot be expected on shallow, unproductive soils; nor can it be expected that the conservation of water by mechanical structures of this kind will assist materially in conserving the range if overgrazing and other management practices that destroy the grass are permitted.

Contour furrows and ridges of various sizes and types have been used successfully. Exponents may be found for almost any of the various types of structures, which have been employed thus far; however, some of the most satisfactory results have been obtained from furrows constructed with a common farm lister or moldboard plow. Range contour work usually can be done with these imple-

ments at less expense than with most other tools and relatively small amounts of sod are destroyed in one place by the construction work.

Furrows, 8 to 12 inches wide and 4 to 7 inches deep, on good soil usually have regrassed in from 1 to 3 years (fig. 6) and, when properly spaced, will retain the maximum amount of water at points where it is of most benefit. Spacing of 4 to 8 feet generally has been the most satisfactory for this type of contour furrow. One of the important

TEX–22543

FIGURE 6.—Grama and buffalo grass on lister-type contour furrows at the end of the second growing season. This range was protected from grazing during the latter part of the growing season.

effects, which generally has been observed, is that the area near the furrow develops a more dense sod because of water retained, and this in turn aids in holding still more water.

Small chisel-type furrows often fill with silt and become ineffective in a relatively short time. Large furrows and terraces, widely spaced, destroy wide bands of sod, and grass over slowly, if at all. Often they concentrate more water than can be used at one point while areas between the terraces suffer from lack of moisture. Another frequent objection to large ridges or terraces is that they cannot be readily constructed with ordinary farm implements. Large ridges on very flat slopes may back water over much sod, however, and frequently such structures are effective in reducing wind action near the ground surface and thus may aid in controlling wind erosion (fig. 7).

Some very good results have been obtained from both the very small and very large structures, but in general they are considered less satisfactory than the medium-sized furrows.

Contour structures generally have been of greatest value on land which has a cover of buffalo grass. Buffalo grass is usually found most abundantly on the medium-depth to deep hard lands, which absorb water slowly. This grass recovers on disturbed areas much more rapidly than most other grasses because of its aggressive habit

NM-122

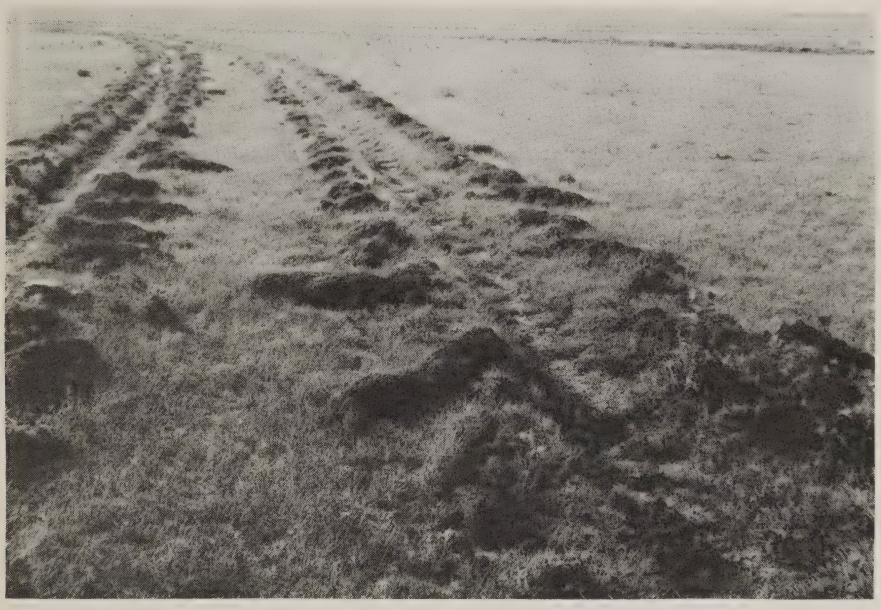
FIGURE 7.—Larger contour structures spread water over a large area, but regrassing of the disturbed area often is slow.

of rooting from runners (fig. 8). Other species of grass also may respond satisfactorily to contour furrows, but in general buffalo grass has been the most outstanding in this respect.

Contour structures that have been put on steep slopes or unproductive soils often have not become resodded and many times have appeared to encourage the increase of weeds and grasses of relatively low value. It also is more expensive to apply contour treatments to rough and broken areas. To obtain proper revegetation it is advisable to reseed contour structures in such areas.

Sandy areas absorb water rapidly and do not usually require contour furrows or ridges to prevent excessive run-off. Since structures on sandy land often fill with silt from both wind and water, at times they may be of more harm than benefit.

To range stockmen, one of the principal values of contour structures is that they enable the maximum use to be made of the limited amount of rain which falls during very dry seasons when the natural grass cover is sparse and when complete utilization of moisture is of the most importance. The moisture conserved by contour structures and the resulting increase in forage production may enable ranchers to maintain normal-sized breeding herds during drought periods where it would not be possible otherwise. Available figures indicate



TEX-7580

FIGURE 8.—Lister-type furrows on a buffalo grass pasture revegetate rapidly. These furrows were constructed with a three-row lister, with the center bottom removed. This picture was taken 3 months after the furrows were constructed.

that the cost of constructing contour furrows, including surveying costs, will range from approximately 30 cents to $1 per acre, or more in extreme cases, depending on the topography, type of equipment available, and other factors.

WATER DIVERSIONS AND SPREADING

The diversion of water from natural water courses to adjacent slopes where it can be spread over productive grassland may be highly profitable if proper sites are available. This not only has the advantage of reducing flood hazards and erosion losses, but will increase forage production on the spreading grounds. The most common type of spreader is a small dam placed in a water course, with gradient ditches or terraces leading the water out to gentle slopes where it is

released through openings in the ditches or terraces. Often such diversion structures may be very effective in controlling gully heads if placed immediately above the gullies.

Where terraces or ridges are used for diversion, it is frequently desirable to make openings at several places to let a limited amount of water through in order to secure effective spreading over the greatest amount of land (fig. 9). Water spreading should be attempted only on gentle and uniform slopes and the water should be released only at points where it will spread on the land and not tend to concen-

COLO-3616

FIGURE 9.—A newly constructed water diversion and spreading system. The terrace opening in the foreground is designed to hold some water above the ridge and release the excess to spread on grassland below.

trate in draws or low places and cause gullying. Water spreading ordinarily should not be practiced except where there is a satisfactory cover of grass on the spreading grounds, because it is difficult to control a large amount of water on sparsely covered or denuded areas and erosion is likely to result. Water spreading usually is not practical on the loose, sandy soils, rough, broken lands, and seldom will very thin shallow soils give satisfactory response. Water-diversion structures, however, may be highly practical where the normal run-off from shallow lands, and the rough, broken lands can be spread over adjacent slopes with productive soil. Heavy clays may be satisfactory as spreading grounds if the water can be retained on the land for some time to permit its penetration into the tight soils.

Development of Range Water Facilities

Natural water holes are relatively far apart on the Plains. Numerous intermittent lakes or playas are dotted over the broad stretches of level land on the High Plains, but they are usually dry when the water is needed most. A majority of the streams that dissect the Plains also are intermittent. They carry a considerable head of floodwater during periods of heavy rainfall, but in many places are completely dry during hot summer months. A few springs flow the year around,

TEX-5266

Figure 10.—Well-constructed ponds often may serve to supply livestock water where more suitable watering facilities are not readily available.

but, as a whole, water facilities for livestock are entirely inadequate under natural conditions.

Man's occupancy of the Plains and his attempts to use as much of the grass as possible for grazing livestock has led to the development of additional watering places, such as ponds and wells, but even yet, many of the ranges do not have sufficient water during drought periods and often the watering places are too far apart.

PONDS

The construction of ponds or storage tanks for use as watering places affords a practical method of supplying water in many dry locations (fig. 10). This type of water is usually temporary unless very large ponds are built. If the management of the ranch is properly planned, however, it ordinarily will be possible to use the

range adjacent to the ponds during the season when water is available, and, in this way, they may be of great value as a supplement to permanent water supplies. In many cases, ponds can be constructed at less expense than wells and may be built in locations where satisfactory water supplies cannot be obtained from underground sources.

Pond sites.—Satisfactory pond sites usually can be found on all ranges except those with very sandy or shallow soils. The selection of a pond site should be influenced by its location with respect to good grazing lands and the distance from other sources of water. The type and size of the drainage area and the probable cost of dam and spillway construction also must be considered in selecting sites.

Where the drainage area above a pond is too large, excessive run-off from very heavy rains may overtop and destroy the dam. If the drainage area is too small, the pond probably will be dry during drought periods when it is needed most. Any serious sheet or gully erosion in the drainage area may cause the pond soon to fill with silt and become useless. The dam site should be such that the dam can be constructed at a minimum cost and still afford the maximum depth of water in the pond. The depth of water in a pond is highly important in the southern Plains region because of the high evaporation rate. A minimum depth of 10 feet is recommended. Surface evaporation in the southern Great Plains is approximately 60 inches a year, most of which occurs during the spring and summer months. A pond that has a potential water supply of less than 5 feet below the spillway level will normally lose most of its water through evaporation during the summer months of dry years.

Dams and spillways.—The spillway of a pond is important. It is necessary that a suitable site be available for the construction of a wide spillway of sufficient capacity to carry the run-off from the heaviest rains. The spillway also must have a suitable place to empty. Turning water loose from a spillway near rough and broken areas may cause serious gullying. The services of a competent engineer in selecting the site and designing the pond may save needless expense from loss of improperly constructed dams or ponds.

Use and care of ponds.—Larger ponds not only may serve as stock-watering places, but also may be used to irrigate small tracts of feed, gardens, or other crops. If properly developed for fish, waterfowl, and other types of wildlife, they may make good recreation spots. Small ponds often can be constructed across gullied areas and serve to check further gullying. Fencing of an area immediately above the pond, supplemented by construction of dikes to check the flow of water and aid in holding up silt, helps materially to lengthen the effective life

of a pond. Establishing a heavy cover of grass or other vegetation in the watercourse at the head of a pond will cause floodwaters to drop a considerable part of their silt load, thus affording protection to the pond. In some cases, it may be desirable to fence the pond and water the livestock from a tank placed below the dam and fed by a pipe from the pond. Fencing is especially desirable for very large ponds.

SPRING DEVELOPMENT

Both intermittent and ever-flowing springs are found in various parts of the southern Great Plains, particularly, in rough, broken areas adjacent to higher lands. A more satisfactory flow from springs may be expected if they are fenced to prevent livestock from trampling and puddling the water. An increased amount of usable water often can be obtained from a spring by walling it up and running the water through a pipe to a tank below. The installation of various types of water-retention structures, particularly gully-control structures, on the lands above intermittent springs may be beneficial in maintaining a more dependable flow of water. A dense sod of grass or undisturbed woodland usually is the most effective means of reducing run-off from the lands above and maintaining the flow of water in springs.

WELL DEVELOPMENT

In much of the southern Great Plains region, which is not watered by springs and streams, wells constitute the most satisfactory and dependable source of water supply for livestock. Ordinarily, wells are more dependable than ponds, and where water is found at a reasonable depth, they sometimes are less expensive. Windmills usually can be depended on for pumping power in most sections of the Plains (fig. 11). There are some areas in which there is no dependable source of underground water and it is necessary to develop other types of watering facilities. It is very desirable to maintain adequate storage at wells, particularly when windmills are depended upon as the source of power. Provisions should be made for storing a reserve supply of water that will serve for periods when the well is being repaired or when there is not sufficient wind to supply pumping power. (See Farmers' Bulletin No. 1859, Stock-Water Developments, Wells, Springs, and Ponds.)

Gully Control

Gully erosion is less serious generally over the southern Plains than in most other regions of the country, but there are many localized areas where gullying is severe, particularly on the rough, broken lands

and on the steeper slopes with heavy clays or shallow soils. Gullies sometimes occur on the medium-depth hard lands that have been denuded of vegetation. The best method for control and prevention of gullies is to stop surface run-off by means of grass cover and supplemental structures. Where this is done, gullies usually will not

NM–606

FIGURE 11.—Wells often are the most dependable source of stock water on the Plains if underground supplies are not too far below the surface. Windmills usually can be depended on for pumping power.

develop. Where they occur, the most satisfactory method of control is to divert the water away from the gully head and spread it on other areas. Protection by fencing often will be of material benefit in producing a growth of vegetation that may prevent further cutting and eventually heal the gullies.

Small dams may be profitably constructed in gullies where the area is properly protected. They will collect silt which will serve as a place for vegetation to begin growth (fig. 12). The value of small structures placed in gullies usually is temporary except when other protective

measures also are used. Vegetation must be depended upon for permanent control of most gullies. (See Farmers' Bulletin No. 1813, Prevention and Control of Gullies.)

Revegetation

Some of the range lands in the southern Great Plains have had practically all the vegetation destroyed by overgrazing, drought, wind erosion, or by other causes. Still more frequent are range areas on

COLO-6070

Figure 12.—Small dams constructed in gullies may bring about temporary stabilization and catch silt on which vegetation will grow and permanently stabilize the gully.

which the grass stands have been depleted to the extent that they have little value for grazing purposes. If these ranges are ever to attain their highest economic usefulness within a reasonable period, revegetative measures must be instituted.

On lands where the grass has not been completely destroyed, revegetation normally can be accomplished, even though the grass is very sparse, if water conservation is practiced and grazing is prohibited for several years. If protective measures on abused areas are started in time, recovery may be very rapid and the areas again be in suitable condition for use in a short time. On the other hand, if misuse has proceeded to the point that sod cover is completely destroyed,

retirement for an indefinite period may be necessary; in which case the same revegetative measures should be instituted as on cultivated land that is being retired.

On lands that have been cultivated and are being retired to grass, or on native pastures completely denuded of grass cover, it is usually desirable to give nature some assistance in the revegetation process. The first step in returning bare land to grass is to stop soil blowing. Temporary stabilization of eroding hard lands and moderately sandy soils usually can be accomplished by contour listing or chiseling and allowing weed growth to cover the land. It sometimes is necessary on bare land to plant erosion-resistant crops, such as Sudan grass, broomcorn, sorgo, or grain sorghums for immediate stabilization before weed growth will cover the ground successfully. Weed growth normally is the first step in nature's process of reestablishing grass.

The natural processes of revegetation usually are very slow, many years being required for the land to become covered with high-quality forage plants, but this process may be hastened by planting adapted grasses during favorable seasons on land having an abundance of crop residues or other nongrowing cover. Native grasses, including blue grama, side-oats grama, sand dropseed, and buffalo grass, are best adapted for this purpose on the hard lands, while on the moderately sandy lands the same mixture of grasses should be used except that sand bluestem should be substituted for buffalo grass.

Grasses should be planted during the spring, preferably in April. It is very difficult to establish a stand of grass by seeding it on land covered with growing weeds or volunteer crops, which compete with small grass plants for moisture. If weeds come up thickly after grasses are planted, they should be mowed. Sorghum cover crops on land to be planted to grass should be close-drilled, with rows 12 to 20 inches apart. The cover crop should be mowed high before it produces seed, and all the crop left on the ground as an added protection for the soil.

Most sandy loam soils should be revegetated in the same manner as the hard lands and moderately sandy lands. The revegetation of loose, sandy soils, however, may be a more difficult problem, especially if they have lost most or all of the plant cover and have a tendency to form dunes. Wind and moving sand on such lands usually kill young plants before they have a chance to form a ground cover that will hold the soil in place.

Stabilization of loose, sandy soils sometimes can be effected by deep listing while the ground is wet during the summer or early fall. Weeds may come up and cover the ground after listing if conditions are especially favorable. If immediate stabilization is desired, however, it usually is necessary to make plantings of sorghum crops during

favorable weather before soil blowing can be checked sufficiently to permit weed growth. Sometimes it may be necessary to cover loose sands with a mulch of straw or stalks before sorghum growth can be established satisfactorily. Once annual weed growth has covered the ground it should be carefully protected until more permanent vegetation has been established. If the weed growth is largely Russian thistle, it should be mowed in the late summer or early fall. Mowing will help to prevent weeds blowing off as tumbleweeds during spring winds and the residues left from mowing will assist in forming a protective mulch over the sand.

Revegetation by nature of loose, sandy soils in many cases is very slow. Where attempts are made to plant grass seed on these lands, great pains should be taken to assure complete stabilization before the plantings are made. A seed mixture of sand bluestem, sand reedgrass, and sand dropseed, with a small amount of blue grama and side-oats grama, should be used for plantings on these lands. Grass seed always should be planted in a dense cover of stubble from sorghums or other erosion-resistant crops. (See Farmers' Bulletin No. 1825, Sand Dune Reclamation in the Southern Great Plains, by Charles J. Whitfield and John A. Perrin, August 1939.)

Ranch Management

The establishment and continuance of a proper range-conservation program is dependent upon a sound organization of the ranch operations. Changes in conditions during recent years may necessitate a revision or change in the plan of operation that has been in effect. Proper use of each ranch requires that a plan of management for maximum production and conservation of its resources be developed according to its individual requirements and resources. Only a few general rules can be given for wide application.

Most of the southern Plains range may be used satisfactorily for either cattle or sheep production. In general, cattle make more satisfactory use of areas of tall or coarse grass. The greatest possible flexibility in the livestock herd should be maintained in order to permit adjustments in numbers to meet fluctuations in forage production with the least inconvenience. Some ranchers accomplish this by holding calves over to be sold as yearlings. In case of drought, both calves and yearlings can be sold, thereby reducing the grazing load considerably without materially affecting the size of the breeding herd.

All ranches should have sufficient improvements such as fences, water developments, corrals, and dipping vats, to care for the livestock properly; however, improvements are expensive, and, from the standpoint of practical economics, no more than necessary should be added to the ranch expense. In ranch operations on the southern Plains, it is always important to remember that the returns per acre

from the range are low, usually only a few cents per year, and developments and investments should be in line with the ability of the ranch to support them.

UNIT REORGANIZATION

Much of the abuse of rangelands in this region may be attributed to the fact that the grazing lands often have been broken up into small blocks to make relatively small-sized farm or ranch units. Even on the pastures associated with farms, the grazing lands often are too limited to support the livestock normally required for balanced farming. Many factors, such as increase in cultivated land, cost of land and improvements, changing conditions, overestimation of the range's grazing capacity, and increasing cost of ranch operations, have resulted in the establishment of ranches which are too small to yield the financial returns needed to carry the overhead of a ranch organization and afford a livelihood to the operator. If a ranch will not produce sufficient forage for the livestock which are required for the family income under a system of management which will maintain the productivity of the land, it is not possible to maintain proper grazing practices. In an attempt to get maximum production, ranges are often overgrazed and all the current year's production is utilized. When this is done, erosion occurs, the vigor of the stand is impaired and the range produces less the following year. Thus, each year's production is secured at the expense of the following year and the range goes down in productive value in proportion to the severity of the overgrazing. One of the first considerations in range conservation should be that each operator has sufficient range to enable him to obtain a reasonable income.

Small tracts of range lands associated with farms are particularly subject to overgrazing because of lack of sufficient grazing land for a balanced ranch unit. In such cases, the native pasture should be supplemented either by increased amounts of range lands, or the use of supplemental feed or pastures.

SUPPLEMENTAL FEEDS AND PASTURES

Many ranch units of the Great Plains region have some cultivated land. Ranches which have suitable cropland should make use of such land to produce feeds that can be used during winter, drought periods, or whenever needed in ranch operations. In the western part of the region, the sandy loams are about the only lands that can be recommended for dry-land farming, but in some instances the more level medium-depth or deep hard lands may be used for feed crop production by intensive application of water and soil conservation practices. (See Unnumbered Publication, Conservation Farming for the Hard Lands in the Southern Great Plains.) Some of the

shallow soils in the eastern part of the region may be suitable for feed crop production, but, with less than 16 inches of annual rainfall, it is never advisable to attempt cultivation of shallow soils and heavy clays. Loose, sandy lands should never be cultivated because of the wind-erosion hazard.

Most Great Plains ranchers use supplemental feeds of some type, and wherever it is possible to produce the feed on the ranch, the cash outlay for purchased feeds may be considerably reduced. Where possible, it is desirable to store up a supply of feed that can be carried over from year to year as a reserve against drought or other emergency

COLO–3716

FIGURE 12.—Reserve feed supplies for winter use and for drought years are a highly essential feature of good ranch management on the Plains.

(fig. 13). Reserve feed supplies in this dry climate can ordinarily be stored in the form of stacked feeds, trench silos, or otherwise. Properly stacked feeds and forage usually will remain useful for several years.

Purchased feeds on ranches usually consist largely of concentrates which may be fed on the pastures. The small amounts ordinarily fed do not relieve the range to any appreciable extent, but they may assist in maintaining the livestock.

It is an asset to any ranch to be able to supply roughage for feed during the winter, especially during blizzards when the range is covered with snow. While crop production and supplemental feeding may

not be considered essential to ranch operation on most of the Plains, it is a practice which may be of great value in stabilizing the ranch operations and in improving the condition of the range livestock. When feed production can be developed to establish a reserve supply, the risk in operation is reduced to a considerable degree since liquidation and sale on unfavorable markets often may be avoided. Production and use of supplemental feeds also may result in protection and improvement of the range by relieving the grazing load at critical periods.

The use of supplementary pastures grown on sandy croplands, medium-depth hard lands, or other land suitable for cropping often is a desirable practice. Such pastures will give rest to some of the native pastures. Wheat and rye for late winter and early spring and Sudan grass or other drought-resistant crops for summer use are recommended for supplementary pastures. Many ranches have areas of native meadow which may be used advantageously for the production of hay. In some cases small irrigated tracts may be developed to help some of the feed problems.

Wildlife and Woodland

On many ranches the natural protection afforded by topography may be supplemented by planting trees and shrubs in suitable locations to be used as windbreaks during the winter and for shade in the summer. Such plantings should be made on favorable sites and usually where diversion water is available or run-off can be prevented. In some instances, shrub plantings may be made in gullies to assist in stabilization. Plantings around ponds are particularly valuable for wildlife food and shelter; and fenced areas above stock ponds usually develop a heavy growth of vegetation, which may afford cover of value for wildlife.

Retirement of land to permanent vegetation, pasture improvement, protective plantings of shrubs and trees, and the proper management of wooded areas on the range are recognized as good wildlife-management practices. Conservative grazing is also recognized as a good wildlife-management practice, since it tends to provide food and cover for the species most commonly considered desirable. Such birds as quail, pheasants, and doves may aid materially in reducing insect damage, and in other ways be of value to the ranch.

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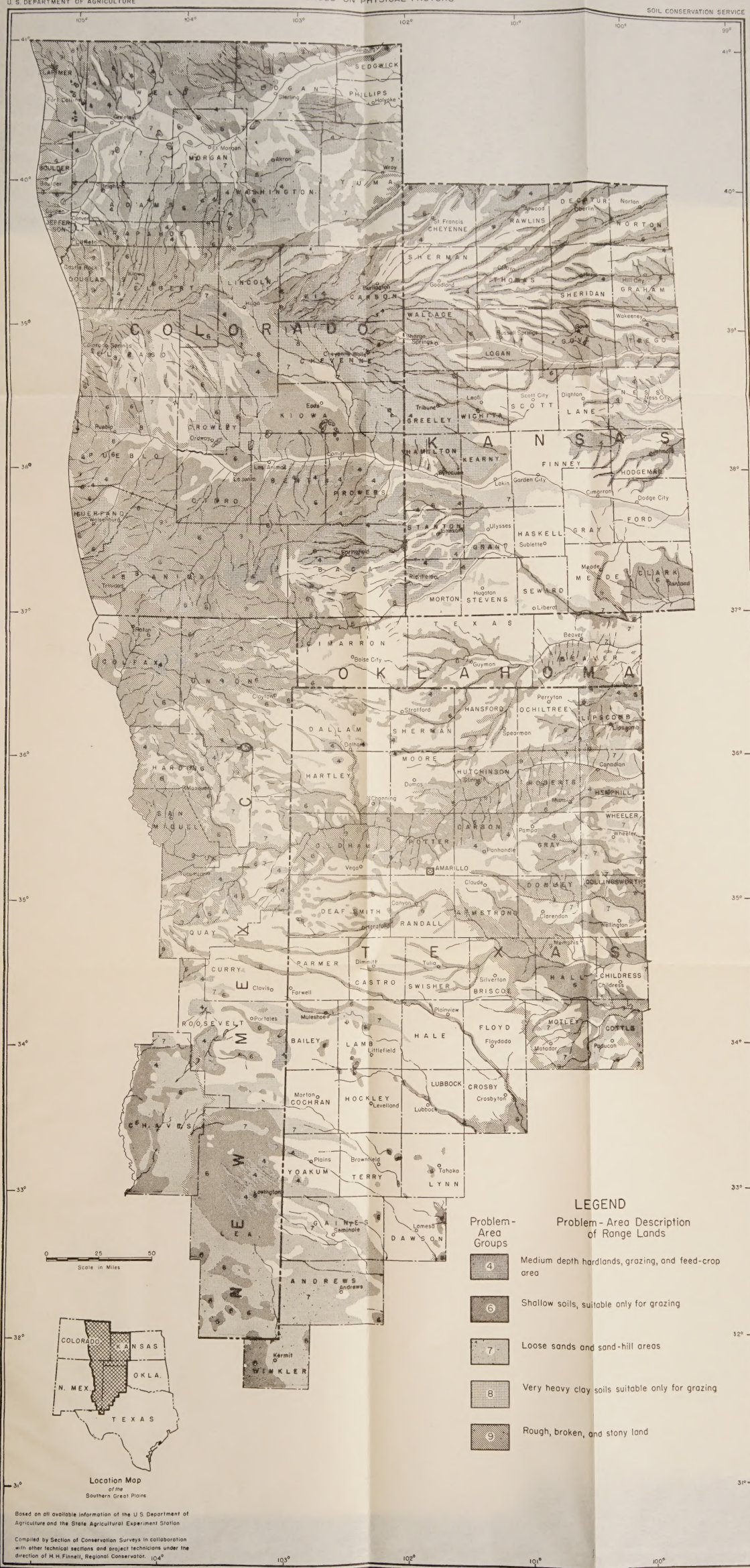
SOIL CONSERVATION PROBLEM-AREA GROUPS OF THE RANGE LANDS OF THE SOUTHERN GREAT PLAINS

BASED ON PHYSICAL FACTORS

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE



LEGEND

Problem-Area Groups	Problem-Area Description of Range Lands
4	Medium depth hardlands, grazing, and feed-crop area
6	Shallow soils, suitable only for grazing
7	Loose sands and sand-hill areas
8	Very heavy clay soils suitable only for grazing
9	Rough, broken, and stony land

Based on all available information of the U.S. Department of Agriculture and the State Agricultural Experiment Station

Compiled by Section of Conservation Surveys in collaboration with other technical sections and project technicians under the direction of H. H. Finnell, Regional Conservator.

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Location Map
of the
Southern Great Plains

Based on all available information of the U.S. Department of Agriculture and the State Agricultural Experiment Station

Compiled by Section of Conservation Surveys in collaboration with other technical sections and project technicians under the direction of H. H. Finnell, Regional Conservator.